

# Gabriel E. Lipkowitz

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[Scholar](#)

Research interests      Computational design, Spatial computing / Extended reality, Computational fabrication, Technical human-computer interaction, Physical computing

Education      **Stanford University**      Stanford, CA  
PhD in Mechanical Engineering      2020 – Present  
Research focus: Computational design and fabrication  
Coursework focuses: Robotics  
Advisors: Professors Joseph DeSimone and Eric S.G. Shaqfeh.  
Anticipated graduation: June 2024

**Imperial College London**      London, UK  
MSc in Applied Computational Science and Engineering      2019 – 2020  
*Graduated with highest honors*  
Advisors: Professors J.P. Latham and Eleanor Schofield

**Princeton University**      Princeton, NJ  
Bachelor of Arts      2015 – 2019  
*Graduated summa cum laude*

Awards and Fellowships      Fulbright Scholarship (US/UK Fulbright Commission)      2019-2020  
NSF Graduate Research Fellowship      2020 - Present  
Solid Freeform Fabrication Symposium NSF Student Award      2022, 2023  
Data Science Institute Fellow (University of Virginia)      2019  
Sigma Xi thesis award, Princeton University      2019

Research Publications (Conferences)      **Palette-PrintAR: augmented reality design and simulation for multi-color resin 3D printing**  
Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.  
Accepted: *Association for Computing Machinery, Conference on Human Factors in Computing Systems, Full Paper, 2024.*

**Palette-PrintAR: an augmented reality fluidic design tool for multicolor resin 3D printing**

Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.

*Association for Computing Machinery, Symposium on User Interface Software and Technology, Late-Breaking Work, 2023.*

**Paraflow: A Computational Design Tool for Support-free Multimaterial 3D Printing**

Lipkowitz, G., Shaqfeh, E.S.G. and DeSimone., J.M.

*Association for Computing Machinery, Conference on Human Factors in Computing Systems, Late-Breaking Work, 2023.*

**Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation**

Lipkowitz, G., Krishna, N. Coates, I., Shaqfeh, E.S.G., and DeSimone, J. M.

*Association for Computing Machinery, Symposium on Computational Fabrication, Full paper, 2023.*

**Interactive Fluid Dynamics Simulation with Real-time Visualization for Augmented Resin 3D Printing**

Lipkowitz, G., DeSimone, J.M.

*International Solid Freeform Fabrication Symposium, Full Paper, 2023.*

**Generative co-design for microfluidics-accelerated 3D printing**

Lipkowitz, G., Shaqfeh, E.S.G., DeSimone, J.M.

*Association for Computing Machinery, Symposium on Computational Fabrication, Demonstration track, 2022.*

**Fluidics-Informed Fabrication: A Novel Co-design for Additive Manufacturing Framework**

Lipkowitz, G., Shaqfeh, E.S.G. and DeSimone, J.M.

*International Conference on Human-Computer Interaction, Full Paper, 2023.*

**Digital Microfluidic Design for Injection Continuous Liquid Interface Production of 3D Objects**

Lipkowitz, G., ..., Shaqfeh, E.S.G., DeSimone, J.M.D

*International Solid Freeform Fabrication Symposium, Full Paper, 2022.*

Research  
Publications  
(Journals)

**Injection continuous liquid interface production of 3D objects**

Lipkowitz, G., Samuelsen, T., Hsiao, K., Lee, B., Dulay, M. T., Coates, I., ...  
DeSimone, J. M.  
*Science Advances, 2022.*

**Growing three-dimensional objects with light**

Lipkowitz, G.\*, Saccone, M.\*, ..., and DeSimone, J.M.

\* Authors contributed equally to this work.

Revision stage: *Proceedings of the National Academy of Sciences*

**Bioinspired fluidic design for additive manufacturing**

Lipkowitz, G., Krishna, N., Coates, I., Shaqfeh, E.S.G., and DeSimone, J.M.  
Under review: *Nature*

**Single-digit-micrometer-resolution continuous liquid interface production**

Hsiao, K., Lee, B. J., Samuelsen, T., Lipkowitz, G., Kronenfeld, J. M., Ilyn, D., ..., DeSimone, J. M.  
*Science Advances, 2022.*

Teaching

**CS11SI: How to Build VR - An Introduction to Virtual Reality Design and Development** Fall 2023

*Student-initiated course project advisor*

Stanford University

This course exposes students to the basics of designing for virtual reality technologies.

**CEE 220C: Parametric Design and Optimization** Spring 2022

*Teaching assistant*

Department of Civil and Environmental Engineering, Stanford University

This course explores tools and techniques for computational design and parametric modeling as a foundation for design optimization.

**CEE 220A: Building Modeling for Design** Summer 2022

*Head teaching assistant*

Department of Civil and Environmental Engineering, Stanford University

The foundational Building Information Modeling course introduces techniques for creating, managing, and applying of building information models in the building design and construction process.

**Biodesign collaborative associate** Spring 2022 - Present  
*Byers Center for Biodesign, Stanford University*  
Mentored post-graduate students in computer-aided design and digital fabrication workflows using 3D printers, laser cutters, and 3D scanners.

**Graduate teaching assistant** Spring 2023 - Present  
*Uytensu Undergraduate Teaching Lab, Stanford University*  
Mentored undergraduates in CAD practices and installed 3D printers for use in undergraduate courses and extracurricular projects.

**CS12SI: Spatial Computing Workshop** To be offered Spring 2024  
*Student-initiated course instructor*  
Stanford University  
Course to expose students to the basics of Apple Vision Pro development using principles of spatial design and visionOS, including using SwiftUI and Unity PolySpatial workflows.

Exhibits

**G-code is my love language**  
*San Jose State University* November 2023 - February 2024  
*Fabrication lead*  
Fabricated and helped to design invited artists' pieces for 3D printing, and contributed augmented reality-based exhibit tool.

Industrial work

*Stanford XR Project Incubator*  
Organizer (Winter 2023 - Present)  
Mentored by members of Apple's Vision Products Group (VPG), translating XR design academic research conducted at Stanford into prototype visionOS application for deployment to Apple Vision Pro.

*Immerse the Bay Hackathon*  
Organizer (Fall 2023)  
With Stanford XR and external contributors, mentors, and judges from Apple, Unity, ShapesXR, Foundary, and other AR/VR companies, helped to organize a XR hackathon with 300 hackers (largest in Bay Area history).

*Layer Construction*  
Chief Technology Officer (2022-Present)  
Start-up (stealth mode) focusing on mobile 3D printing for concrete construction. My role focuses on developing computer vision machine learning models for robot navigation in unstructured environments.

*Methods and Systems for Making Polymeric Microstructures*

Patent issued (2023)

Lipkowitz, G. Dulay, M., Samuelsen, T. Shaqfeh, E.S.G., DeSimone, J.M.

*Polymeric Structures having a Micro-void space and Methods for Making the Same*

Patent pending

Coates, I. Lipkowitz, G. DeSimone, J.M.

External Talks &  
Presentations

*Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation*

Oral presentation

ACM Symposium on Computational Fabrication

New York City, NY USA, October 2023

*Demonstrating Paraflow: Interactive fluid dynamics simulation with real-time visualization for augmented resin 3D printing*

Oral presentation

International Solid Freeform Fabrication Symposium

Austin TX USA, August 2023

*Designing data: Methods for 3D synthetic data generation for computer vision machine learning*

Invited lecture

COMPSCI C8: Foundations of Data Science

UC Berkeley, August 2023

*Multimaterial 3D printing by injection continuous liquid interface production*

Oral presentation

eWEAR Annual Symposium

Stanford University, February 2023

*Accelerated 3D printing with injection continuous liquid interface production*

Presentation

Stanford Bio-X Symposium

Stanford University, August 2022

*Injection continuous liquid interface production*

Additive Manufacturing of Soft Materials, Gordon Research Conference

Ventura CA USA, August 2022

*Digital Microfluidic Design for Injection continuous liquid interface production*  
Presentation at International Solid Freeform Fabrication Symposium  
Austin TX USA, July 2022

*Multimaterial printing by injection continuous liquid interface production*  
Presentation at 3D Printing-enabled Polymeric Composites and Hybrid Systems Session, American Chemical Society  
San Diego CA USA, March 2022

*3D Printed Buildings: Can it be green, affordable, and sustainable?*  
Discussion lead: CEE 132A Sustainable Architecture and Engineering Colloquium: Re:Defining Sustainability  
Stanford CA USA, October 2023

*Paraflow: Generative Design for 3D Printing with Fewer Supports*  
Applied Artificial Intelligence, Big Data, and Data Analytics Session, American Institute for Chemical Engineers  
Orlando FL USA, November 7, 2023

#### Academic Service

Session chair, Solid Freeform Fabrication Symposium (2023)  
Peer reviewer, Nature (2023)  
Peer reviewer, Nature Communications (2022)  
Peer reviewer, Science Advances (2022-2023)  
Peer reviewer, Solid Freeform Fabrication Symposium (2023)  
Peer reviewer, ACM Symposium on Computational Fabrication (2023)  
Peer reviewer, ACM Conference on Human Factors in Computing Systems (2023)

#### Technical Skills

##### **Programming languages**

Proficient in: C#, C++, Python

##### **3D Modeling and Game Engines**

Proficient in: Rhino/Grasshopper, Fusion 360, Revit/Dynamo, Blender, Unity  
Familiar with: Unreal, Onshape

Selected  
coursework

**PhD**

CEE 220A: Building Modeling for Design and Construction

CEE 220B: Building Modeling Design Studio

CEE 220C: Parametric Design and Optimization

CS 221A : Introduction to Artificial Intelligence

CS 223A: Introduction to Robotics

CS 225A: Experimental Robotics

CS 327A: Topics in Advanced Robotic Manipulation

CS 274A: Principles of Robot Autonomy

ME 210: Introduction to Mechatronics

ME 220: Introduction to Sensors

**MSc**

CSE 1: Modern programming methods

CSE 2: Modelling dynamical processes

CSE 6: Patterns for parallel programming

CSE 7: Inversion and optimisation

CSE 8: Machine learning